



Climate change and health costs of air emissions from biofuels and gasoline

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Abstract:

Environmental impacts of energy use can impose large costs on society. We quantify and monetize the life-cycle climate-change and health effects of greenhouse gas (GHG) and fine particulate matter (PM(2.5)) emissions from gasoline, corn ethanol, and cellulosic ethanol. For each billion ethanol-equivalent gallons of fuel produced and combusted in the US, the combined climate-change and health costs are \$469 million for gasoline, \$472-952 million for corn ethanol depending on biorefinery heat source (natural gas, corn stover, or coal) and technology, but only \$123-208 million for cellulosic ethanol depending on feedstock (prairie biomass, Miscanthus, corn stover, or switchgrass). Moreover, a geographically explicit life-cycle analysis that tracks PM(2.5) emissions and exposure relative to U.S. population shows regional shifts in health costs dependent on fuel production systems. Because cellulosic ethanol can offer health benefits from PM(2.5) reduction that are of comparable importance to its climate-change benefits from GHG reduction, a shift from gasoline to cellulosic ethanol has greater advantages than previously recognized. These advantages are critically dependent on the source of land used to produce biomass for biofuels, on the magnitude of any indirect land use that may result, and on other as yet unmeasured environmental impacts of biofuels.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2634804>

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Ecosystem Changes, Unspecified Exposure

Air Pollution: Particulate Matter, Other Air Pollution

Air Pollution (other): SOx; NOx; NH3; VOCs

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

United States

Health Co-Benefit/Co-Harm (Adaption/Mitigation):

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

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Health Impact:

specification of health effect or disease related to climate change exposure

Morbidity/Mortality

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Cost/Economic

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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